

CLAIMS

What is claimed is

- 1 1. A filter unit for the purification of air, the filter unit comprising:
2 a first filter element comprising granular activated carbon as an adsorbent
3 material, and
4 a second filter element comprising a combination of granular activated
5 carbon and activated carbon fibers as an adsorbent material.
- 1 2. A filter unit as in claim 1 wherein the granular activated carbon is
2 spherical activated carbon.
- 3 3. A filter unit as in claim 1 wherein the second filter element is
4 arranged downstream of the first filter element.
- 1 4. A filter unit as in claim 1 wherein the mean particle diameter of the
2 granular activated carbon of the first filter element is greater than the mean particle
3 diameter of the granular activated carbon of the second filter element.
- 1 5. A filter unit as in claim 4 wherein the mean particle diameter of the
2 granular activated carbon of the first filter element is at least 0.05 mm greater than the
3 mean particle diameter of the granular activated carbon of the second filter element.
- 1 6. A filter unit as in claim 4 wherein the mean particle diameter of the
2 granular activated carbon of the first filter element is at least 0.2 mm greater than the
3 mean particle diameter of the granular activated carbon of the second filter element.

1 7. A filter unit as in claim 1 wherein further comprising an additional
2 filter element arranged between the first filter element and the second filter element, the
3 additional filter element containing granular activated carbon as the adsorbent material.

1 8. A filter unit as in claim 1 wherein further comprising at least one
2 separating filter element for separating solid particles preceding the first and second
3 filter elements.

1 9. A filter unit as in claim 8 wherein the separating filter element is a
2 textile material.

1 10. A filter unit as in claim 8 wherein the separating filter element
2 effects purely mechanical separation of solid particles.

1 11. A filter unit as in claim 7 wherein the granular activated carbon of at
2 least one of the first filter element and the additional filter element is present in the form
3 of loose fill.

1 12. A filter unit as in claim 7 wherein the granular activated carbon of at
2 least one of the first filter element and the additional filter element is fixed in a three-
3 dimensional, air-permeable support structure.

1 13. A filter unit as in claim 12 wherein the three-dimensional support
2 structure is an open-cell foamed plastic.

1 14. A filter unit as in claim 13 wherein the mean cell diameter of the
2 open-cell foamed plastic is at least twice as great as the mean particle diameter of the
3 granular activated carbon of the at least one of the first filter element and the additional
4 filter element.

1 15. A filter unit as in claim 7 wherein the mean particle diameter of the
2 granular activated carbon of the first filter element is greater than the mean particle
3 diameter of the granular activated carbon of the additional filter element.

1 16. A filter unit as in claim 7 wherein the mean particle diameter of the
2 granular activated carbon of the first filter element is at least 0.05 mm greater than the
3 mean particle diameter of the granular activated carbon of the additional filter element.

1 17. A filter unit as in claim 7 wherein the mean particle diameter of the
2 granular activated carbon of the first filter element is at least 0.2 mm greater than the
3 mean particle diameter of the granular activated carbon of the additional filter element.

1 18. A filter unit as in claim 1 wherein the granular activated carbon is
2 produced by carbonization and subsequent activation of suitable organic starting
3 materials in granular form.

1 19. A filter unit in as in claim 1 wherein the activated carbon fibers are
2 produced by carbonization and subsequent activation of suitable organic starting fibers.

1 20. A filter unit as in claim 19 wherein the starting fibers are selected

2 from among the groups of cellulose fibers, fibers based on cellulose derivatives, phenol
3 resin fibers, polyvinyl alcohol fibers, pitch fibers, acrylic resin fibers, polyacrylonitrile
4 fibers, aromatic polyamide fibers, formaldehyde resin fibers, divinylbenzene-crosslinked
5 polystyrene fibers, lignin fibers, cotton fibers and/or hemp fibers.

1 21. A filter unit as in claim 1 wherein the activated carbon fibers are
2 present in the form of an activated carbon fiber textile material.

1 22. A filter unit as in claim 1 wherein the activated carbon fibers have
2 mean fiber diameters of 1-25 μm .

1 23. A filter unit as in claim 1 wherein the activated carbon fibers have a
2 length-specific weight (titer) of 1-10 dtex.

1 24. A filter unit as in claim 1 wherein the mean particle diameter of the
2 granular activated carbon in the second filter element is at least three times greater than
3 the mean fiber diameter of the activated carbon fibers.

1 25. A filter unit as in claim 1 wherein the granular activated carbon and
2 the activated carbon fibers in the second filter element are arranged in layers that are
3 separate but that border on each other and/or are permanently joined to each other.

1 26. A filter unit as in claim 1 wherein at least one of the granular
2 activated carbon and the activated carbon fibers in the second filter element are fixed
3 on an air-permeable support.

1 27. A filter unit as in claim 1 wherein at least one of the granular
2 activated carbon and the activated carbon fibers have a specific surface (BET) of at
3 least 800 m²/g and up to 1,500 m²/g.

1 28. A filter unit as in claim 1 wherein at least one of the granular
2 activated carbon and the activated carbon fibers are impregnated with an impregnation.

1 29. A filter unit as in claim 28 the impregnation is based on at least one
2 of metals and metal compounds selected from the group comprising copper, cadmium,
3 silver, platinum, palladium, zinc, and mercury, and their compounds.

1 30. A filter unit as in claim 28 wherein the impregnation is one of an
2 acid and a basic impregnation.

1 31. A filter unit in as in claim 28 wherein said impregnation comprises
2 an impregnating agent which is 0.01 to 15 wt.% of the amount of impregnated activated
3 carbon material,

1 32. A filter unit for the purification of air, the filter unit comprising:
2 a first filter element comprising granular activated carbon as an adsorbent
3 material,

4 an additional filter element comprising granular activated carbon as an
5 adsorbent material, and

6 a second filter element comprising granular activated carbon and activated

7 carbon fibers as an adsorbent material.

1 33. A filter unit as in claim 32 wherein the filter elements are arranged
2 one after the other in a downstream as follows: the first filter element, the additional filter
3 element, and the second filter element.

1 34. A method of purifying air, comprising:
2 providing a filter unit a first filter element comprising granular activated
3 carbon as an adsorbent material, a second filter element comprising a combination
4 granular activated carbon and activated carbon fibers as an adsorbent material, and an
5 additional filter element comprising granular activated carbon as an adsorbent material
6 arranged between the first filter element and the second filter element; and
7 flowing air to be purified through the filter unit.